

PHYSICOCHEMICAL PROPERTIES OF SURIMI FROM FISH PROTEIN  
ISOLATES OF TILAPIA (OREOCHROMIS SP.) PROCESSING WASTES

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2008



PHYSICOCHEMICAL PROPERTIES OF SURIMI FROM FISH  
PROTEIN ISOLATES OF TILAPIA (Oreochromis sp.)  
PROCESSING WASTES

By

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## DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

Signature : .....

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Date : **30 NOVEMBER 2008**

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## ABSTRACT

The increase in world total tilapia production would lead to the mass accumulation of by-products which are of good quality and commercial value. During the improper storage and handling of fish, sufficient time would be given for rigor mortis to occur in the fish and a drop in freshness would be duly noted. The objective of this study was to evaluate the quality of fish protein isolates (FPI) extracted from the processing wastes of red hybrid tilapia. Alkaline-aided extraction was used to extract the FPI from the processing wastes. The FPI were then analyzed during both stages: raw and cooked. Quality attributes between the freshness and type of processing parts used are studied. Parameters used for determining the quality of FPI are the yield percentage, moisture content, pH value, proximate analysis, gel strength and whiteness. The results gave yield percentage ranging between 9.3 – 15.5% for fresh FPI and a drop from 2.6 – 12.2% in yield percentage for aged FPI. The moisture content was insignificantly ( $P<0.05$ ) different between fresh FPI samples but significantly ( $P<0.05$ ) dropped only for aged skin FPI. Crude fat content was significantly ( $P<0.05$ ) higher in skin and head part compared to the other parts and remained significantly ( $P<0.05$ ) high even after aging. However, the crude protein content in fresh skin and head FPI were insignificantly ( $P<0.05$ ) different compared to their aged samples while the flesh and bones FPI significantly ( $P<0.05$ ) dropped after the aging process. The gel strength of fresh FPI were significantly ( $P<0.05$ ) higher in the flesh, bones and head FPI compared to skin FPI but a significant ( $P<0.05$ ) drop in head gel strength was observed after the process of aging. Whiteness were found to be significantly ( $P<0.05$ ) different in all parts of the FPI samples but only a significant ( $P<0.05$ ) drop of whiteness occurred in the skin part after aging while the other significantly ( $P<0.05$ ) increase. Conventional surimi was found to have significantly better gelling properties and whiteness compared to FPI gels extracted from tilapia. However, the by-product that was closely comparable to that of conventional surimi was found to be the bones part. This conclusion was made that FPI extracted from the bone by-products gave results which are promising and showed potential to be used for the extraction of FPI in making surimi-based products.



## CIRI-CIRI FIZIKOKIMIA SURIMI YANG DIBUAT DARIPADA ISOLAT PROTIN IKAN SISA PEMROSESAN TILAPIA (*OREOCHROMIS SP.*)

### ABSTRAK

Peningkatan pengeluaran tilapia dunia akan membawa kepada pengumpulan sisa pemprosesan dengan banyak yang mempunyai kualiti dan nilai komersil yang baik. Sepanjang proses pengendalian dan penyimpanan ikan yang kurang baik, masa yang cukup diberikan untuk berlakunya *rigor mortis* pada ikan dan penurunan tahap kesegaran akan berlaku. Objektif kajian ini bertujuan untuk menilai kualiti isolat protin ikan (FPI) yang diekstrak daripada sisa pemprosesan ikan tilapia merah. Pengekstrakan beralkali digunakan untuk mengekstrak FPI daripada sisa pemprosesan. FPI tersebut kemudiannya dianalisis dalam dua peringkat: semasa mentah dan selepas dimasak. Atribut kualiti antara tahap kesegaran dan jenis sisa pemprosesan yang digunakan dikaji. Parameter yang digunakan untuk menentukan kualiti FPI adalah peratusan hasil, kandungan lembapan, nilai pH, analisis proksimat, kekuatan gel dan keputihan. Keputusan menunjukkan peratusan hasil dalam julat 9.3 – 15.5% untuk FPI segar dan penurunan dari 2.6 – 12.2% dalam peratusan hasil bagi FPI kurang segar. Tahap kandungan air dalam FPI segar didapati tidak berbeza secara signifikan ( $P < 0.05$ ) tetapi terdapat penurunan yang signifikan ( $P < 0.05$ ) bagi kulit FPI kurang segar. Terdapat perbezaan signifikan ( $P < 0.05$ ) yang tinggi bagi bahagian kepala dan kulit bagi kandungan lemak kasar berbanding dengan bahagian lain dan tahap ketinggian lemak tetap signifikan ( $P < 0.05$ ) walaupun selepas penuaan. Protin kasar dalam kelapa dan kulit FPI segar tidak berbeza secara signifikan ( $P < 0.05$ ) semasa dibandingkan dengan sampel penuaan, manakala isi dan tulang FPI turun dengan signifikan ( $P < 0.05$ ) selepas proses penuaan. Kekuatan gel bagi FPI segar adalah tinggi dengan signifikan ( $P < 0.05$ ) dalam FPI isi, tulang dan kepala dibandingkan dengan FPI kulit tetapi penurunan yang signifikan ( $P < 0.05$ ) hanya dilihat pada FPI kepala selepas penuaan. Tahap keputihan berbeza secara signifikan ( $P < 0.05$ ) dalam semua bahagian FPI tetapi hanya turun secara signifikan ( $P < 0.05$ ) dalam FPI kulit selepas proses penuaan manakala bahagian lain meningkat secara signifikan ( $P < 0.05$ ). Surimi didapati mempunyai kekuatan gel dan tahap keputihan yang tinggi secara signifikan ( $P < 0.05$ ) berbanding dengan FPI yang diekstrak daripada tilapia. Walaubagaimanapun, sisa pemprosesan yang paling dekat kalau dibandingkan dengan surimi adalah FPI daripada bahagian tulang. Kesimpulan yang dibuat adalah bahagian tulang memberi keputusan yang baik dan menunjukkan potensi untuk digunakan dalam proses pengekstrakan FPI untuk pembuatan produk berasaskan surimi.